9

Chapter 9 - Solid and Hazardous Waste Disposal and Remediation

A coal-fired power plant produces solid and hazardous wastes. In the case of the ERGS project, the most important solid wastes generated would include ash from the coal combustion, gypsum from the capture of SO_2 emissions, gasifier slag, and elemental sulfur or sulfuric acid. Because the plant would use once-through cooling technology which returns water to Lake Michigan and the make-up water for the boilers would come from the municipal water supply, no water filtration or treatment would occur. Solid wastes from the shops and offices on site would be recycled as much as possible. Waste that could not be recycled would need to be collected and taken away by waste management contractors.

This chapter addresses the potential disposal sites for solid by-products of coal combustion and gasification, the potential for beneficial re-use of those by-products. It also discusses on-going remediation efforts on the OCPP site.

Existing Environment

The existing OCPP solid waste environment includes the coal piles, coal combustion points, handling areas, early ash disposal areas, and three existing landfills on the OCPP property. Two of the existing landfills are now closed. Two additional off-site landfills are also associated with the waste produced at the existing OCPP. Active landfills are discussed in the following section.

Active landfills

There are three active landfills to be considered when examining the potential destinations of the ash that would be produced by the ERGS.

Pleasant Prairie Power Plant Ash Landfill
(DNR License #2786 -- Facility Identification Number 230056310)

This landfill is located in the village of Pleasant Prairie in Kenosha County (see Figure 9-1), approximately 1 to 1.5 miles north of the existing WEPCO Pleasant Prairie Power Plant. It currently accepts bottom ash, fly ash, and sludges from electric and process steam generating facilities. Waste generated at the Pleasant Prairie plant is hauled by truck using roads owned by WEPCO to the landfill. The landfill haul route crosses Bain Station Road. Private contractors also haul this by-product material from the power plant or from the landfill

to various beneficial use projects. All truck traffic serving the landfill and the power plant enters and exits the public roadways at the main plant entrance on 95th Street.

The landfill was approved in 1978 for 25 "cells" with a total design capacity of 4,569,090 cubic yards. The first cell was constructed in 1980. Four cells have been constructed at this time. In 2002, no waste was placed in this landfill. Its remaining capacity as of January 1, 2003 was 4,035,666 cubic yards. The volume of waste in the landfill has been decreasing because utilization efforts have been successful. Under DNR approval, previously landfilled material has been reclaimed as a sand or gravel substitute. At the current rate of waste disposal and reclamation, this landfill's site life is estimated to be greater than 100 years.

Caledonia Ash Landfill
(DNR License #3232 -- Facility Identification Number 252108450)

This landfill is located in the town of Caledonia, approximately one mile west of the OCPP (see Figure 9-1). It currently accepts bottom ash, fly ash, and sludges from electric and process steam generating facilities. Waste generated at the OCPP is hauled by truck to the landfill using roads owned by WEPCO. There is a temporary stockpile of Valley Power Plant ash, from Milwaukee, located in the Caledonia Ash Landfill. Valley Power Plant ash is added to the stockpile when the re-burn system at the Pleasant Prairie plant is unavailable. This temporary stockpile is permitted under Wis. Admin. Code ch. NR 538 and is used as a fuel source (reburned) for the Pleasant Prairie plant under a cooperative agreement. Private contractors also haul by-product from the OCPP plant or from the landfill to various beneficial use projects. All truck traffic serving the landfill and the power plant enters and exits the public roadways at the main plant entrance on Elm Road, or at the STH 32 entrance adjacent to County Line Road. Figure 9-2 illustrates the internal power plant trucking routes for ash to the Caledonia Landfill. A discussion of WEPCO's flyash reburning propgram is found under "Fugitive Dust" in Chapter 11.

The Caledonia landfill was approved in 1987 for 18 cells with total design capacity of 4,048,000 cubic yards. The first cells were constructed in 1990. Six cells have been constructed at this time. In 2002, 34,354 cubic yards of waste was disposed of in the landfill. The remaining capacity as of January 1, 2003 was 2,629,685 cubic yards.

At the current rate of waste disposal and reclamation, the site life is estimated to be 66 years.

Highway 32 Ash Landfill
(DNR License #2801 -- Facility Identification Number 246049100)

This landfill is located in the town of Grafton, approximately four miles southwest of the existing WEPCO Port Washington Power Plant (PWPP). Its location and potential haul route from the ERGS are shown in Figure 9-1. It currently accepts bottom ash, fly ash, and sludges from electric and process steam generating facilities. Waste generated at the PWPP is hauled by truck over public roads to the landfill. There is a temporary stockpile of the PWPP ash located in the Highway 32 Ash Landfill. The temporary stockpile is permitted under NR 538. Periodic withdrawals from the stockpile are used as a fuel source (reburn) for the Pleasant Prairie plant under a cooperative agreement or are delivered to other beneficial users. Private contractors haul byproduct out to various beneficial use projects either from the landfill or directly from PWPP.

Figure 9-1 **Locations of Pleasant Prairie, HWY 32, and Caledonia landfills, including potential haul routes from ERGS**

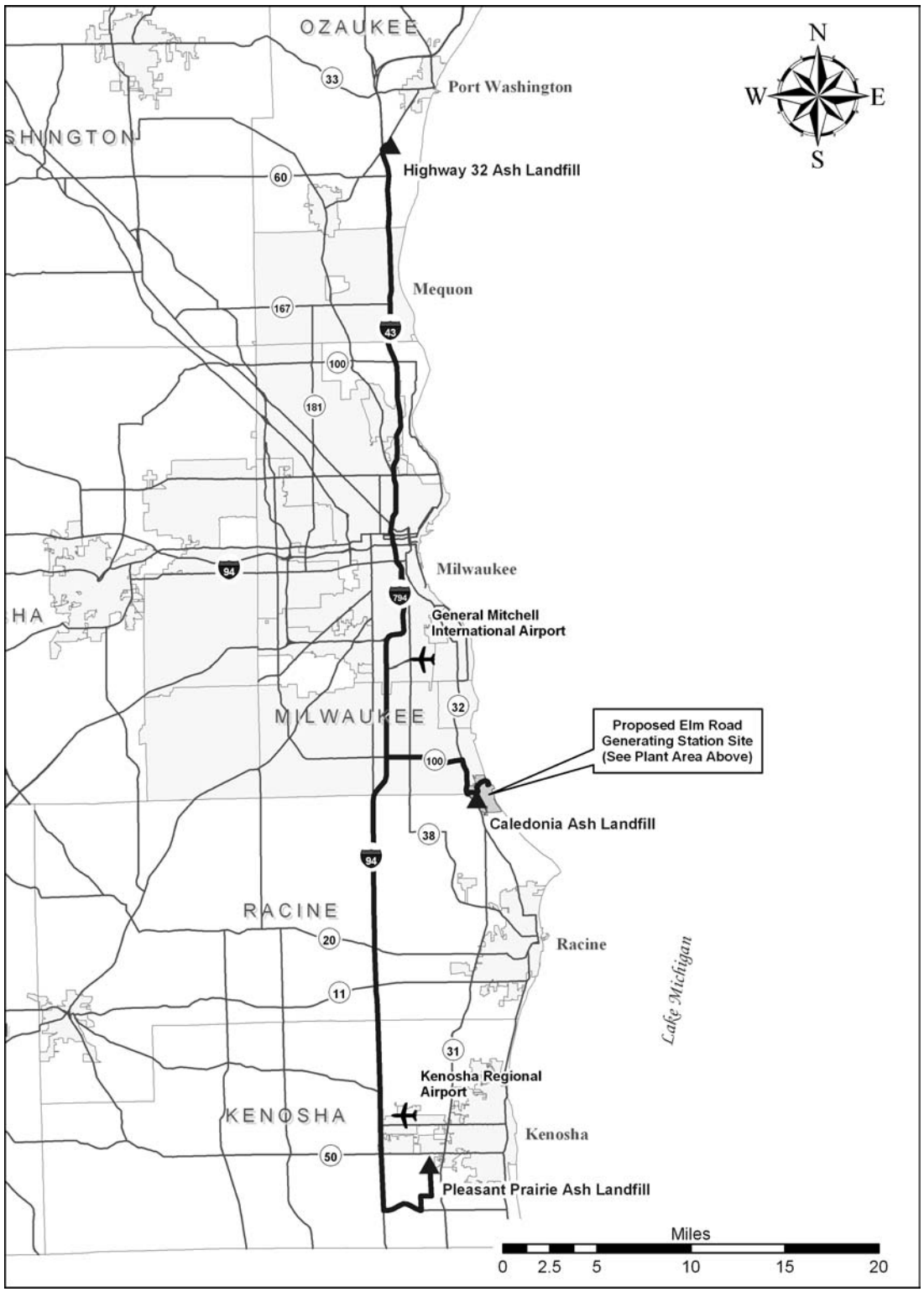


Figure 9-2 Existing OCPP facilities showing on-site ash hauling roads

The landfill was approved in 1978 for 12 cells with total design capacity of 1,999,950 cubic yards. The first cell was constructed in 1978. Ten cells have been constructed at this time. In 2002, 3,119 cubic yards of waste was disposed in the landfill. The remaining capacity as of January 1, 2003 was 685,062 cubic yards.

At the current rate of waste disposal, the site life is estimated to be 35 years.

Closed landfills

There are two closed landfills on the WEPCO's OCPP property. These landfills are called North Oak Creek and South Oak Creek. Closed landfills are not permitted to accept waste.

Early ash disposal areas

In addition to the two closed landfills and one open landfill, four early ash disposal areas (EADAs) were identified on the OCPP property. These are four places on-site where OCPP ash was buried in the early years of plant operation. Each area is of an irregular shape, and present locations are not completely precise. Figure 9-3 shows the approximate locations and extents of the EADAs located on the plant site currently.

EADA #1 is about 5.5 acres in size and is located just southwest of the present main gate to the Oak Creek plant, south of Elm Road. The ERGS bituminous coal pile is proposed for the area now covering this place.

EADA #3 is much larger, about 40 acres, and is located along the eastern side of the Union Pacific rail line, with its northern end extended eastward from the railroad tracks to the existing OCPP electric transmission switchyard. For the ERGS project, it is proposed as a soil stockpile location for the material excavated to build the ERGS units (refer to Chapters 10 and 11 for detailed information on soil stockpiling). The southern half of this EADA lies underneath what is now designated an Isolated Natural Resource Areas of woodland and wetland. Isolated Natural Resource Areas and Primaray Environmental Corridors are also described in Chapter 10. Some of this EADA also lies under the proposed location of new coal yard facilities and a relocated electric transmission switchyard, discussed as part of WEPCO's CUP Option in Chapter 12.

EADA #4 and EADA #5 are adjacent to each other in an area south of the existing South Oak Creek power plant units and just north of the shooting range property. Each of them is about 0.75 acre in size. They would be part of the excavated area if the South Site or the South Site XP options were approved by the Commission, and under the area projected for a wallboard plant if the North Site were approved. These EADAs would be qualified as waste sites when excavated and would have to be addressed as described below in the section on "Excavation Debris."

Figure 9-3 Locations of Early Ash Disposal Areas and current on-site landfills

Present methods of hauling ash

Ash is often "conditioned" by adding water to it so that it does not become airborne. If it is not conditioned, it must be put in an enclosed container for hauling. Ash is hauled to utilization outlets in covered quad axle and semi dump trucks when conditioned, and in bulk tankers when dry. The haul routes for the Caledonia, Highway 32, and P4 landfills are shown in Figure 9-2.

Present methods of re-use

WEPCO's existing plant currently creates two main by-products: fly ash (class C and F) and bottom ash. Class C fly ash is produced by newer boilers and has more calcium. It is used as a cementitious material and is very good for making concrete. Class F fly ash comes from older boilers and has less or no calcium and a high carbon content. It has little to no economic value at this time.

At this time, over 96 percent of these by-products are recycled. Class C fly ash is used as admixtures in concrete and soil stabilization beneath paved surfaces. Bottom ash is primarily used in construction, as sub-base below paved surfaces and beneath commercial buildings. Most of the high carbon Class F fly ash is utilized as a supplemental fuel at Pleasant Prairie Power Plant (see the discussion under "Fugitive Dust" in Chapter 11) or utilized for manufacturing Portland cement.

Reburning of existing landfill material

WEPCO also recently began excavating old landfills and reburning the material in the Pleasant Prairie Power Plant. These previously landfilled by-products were generated from old and inefficient boilers. WEPCO has realized that portions of these by-products still contain valuable fuel. By excavating and burning these by-products, it has also regained additional space in licensed/active landfills.

Expected Changes Due to Proposed Project

Projected volumes of by-products

SCPC units

Since WEPCO's two SCPC units would burn bituminous coal, the primary coal combustion by-products materials generated would include fly ash, bottom ash, and synthetic gypsum.

Fly ash and bottom ash

Table 9-1 illustrates the potential components of the ash by-products from the proposed ERGS SCPC units for both washed and unwashed coal. (Although WEPCO stated in its comments on the draft EIS that it intends to use washed coal for the new ERGS facilities, its air permit application for the South Site and the South Site-Exp is based on the use of unwashed coal.)

Based on the characteristics reported in Table 9-1, the use of washed coal, and an 85 percent capacity factor for the new SCPC units, WEPCO estimates that the amount of coal combustion by-products materials produced by each unit would be:

Fly ash	103,100 tons/year per unit
Bottom ash	25,800 tons/year per unit

Thus, a total of 206,200 tons per year of fly ash and 51,600 tons of bottom ash would be produced each year by the two SCPC units. Using the standards in Wis. Admin. Code § NR 520.15 (20) and a field capacity conversion factor of 1.2 tons/cubic yard, the respective volumes of the fly ash and bottom ash would be calculated at 171,899 cubic yards and 42,975 cubic yards. The total volume of fly ash and bottom ash together would be 214,874 cubic yards per year.

Table 9-1 Potential coal fuel sources and ash content

Fuel Analysis:	Units	Pittsburgh #8 Unwashed Bituminous	Pittsburgh #8 Washed Bituminous
Coal Ultimate Analysis			
Carbon	%	64.24	72.67
Sulfur	%	3.10	2.69
Oxygen	%	4.19	4.84
Hydrogen	%	4.13	4.89
Nitrogen	%	4.15	1.38
Chlorine	%	0.09	0.10
Ash	%	17.61	7.73
Moisture	%	5.50	5.71
Coal Proximate Analysis			
Moisture	%	5.50	5.71
Volatile Matter	%	32.55	35.73
Fixed Carbon	%	44.34	50.84
Ash	%	17.61	7.73
Gross (Higher) Heating Value	Btu/lb	11,500	13,100
Hardgrove Grindability	HGI	56	55
Coal Ash Analysis			
Silica	%	49.16	43.17
Ferric Oxide	%	15.55	21.17
Alumina	%	20.95	21.95
Titanic Oxide	%	0.84	0.93
Calcium Oxide	%	5.13	5.18
Magnesia	%	0.90	0.90
Sulfur Trioxide	%	3.18	4.28
Potassium Oxide	%	1.99	1.45
Sodium Oxide	%	0.65	1.06
Phosphorous Pentoxide	%	0.70	0.59
Undetermined	%	0.95	(0.68)
Total	%	100.0	100.0

Synthetic gypsum

As discussed in Chapters 6 and 7, the ERGS SCPC units would utilize limestone or organic-acid promoted limestone to control and reduce SO_2 emissions. The use of limestone versus organic-acid-promoted limestone would depend upon the fuel sulfur content. Synthetic gypsum by-product would be generated in

this operation regardless. WEPCO estimates that about 271,800 tons/year per unit[104] would be generated by each unit. The two proposed SCPC units would then create a total of 543,600 tons of gypsum per year.

IGCC unit

As discussed in Chapter 6, the proposed IGCC system would include: two or three oxygen blown, coal gasifiers; an air separation unit; a gas conditioning system for removing sulfur compounds and particulates; two combustions turbines with heat recovery steam generators; a steam turbine generator; and coal handling and preparation equipment. The primary by-products of this system would be slag and sulfuric acid.

Gasifier slag

The gasification process would result in the formation of about 100,000 tons/year of slag at the bottom of the gasifier.

Elemental sulfur and sulfuric acid

In the sulfur recovery plant, the sulfur-containing gases from the Acid Gas Removal (AGR) system would be converted to either elemental sulfur or sulfuric acid. Elemental sulfur and sulfuric acid production would be directly related to the sulfur content of the coal. Based on the proposed fuel, the sulfur content of the coal would yield about 33,200 tons/year of elemental sulfur. The quantity of sulfuric acid produced would amount to approximately 60,000 tons/year, or 62,400 gallons per day. This material may be considered hazardous waste.

Characterization of by-products

Fly ash and bottom ash

WEPCO is expected to submit the actual fly ash and bottom ash chemical and physical characterizations for DNR review as soon as the proposed SCPC units are operational. The SCPC units would use sophisticated air pollution units that remove more pollutants from the air discharge. Consequently, the removed pollutants would end up in the solid waste. Since these by-products would be much different than the currently available fly ash and bottom ash, any predication on how the ash would be recycled and how much ash could be recycled is premature.

Gypsum

WEPCO is expected to submit the actual gypsum chemical and physical characterizations for DNR review as soon as the SCPC units are commercially operational. Synthetic gypsum would be a new by-product for WEPCO. The pollution control equipment on the existing OCPP units 5 - 8 does not generate it. WEPCO has expressed confidence that this material could be used in a wall board plant, as discussed near the end of this chapter.

Gasifier slag

This material is not expected to be generated until the year 2011. Its true chemical and physical characterization, therefore, is not available at this time. The full recycling potential of gasifier slag would not be known until after its production and characterization. It would probably require some processing for

[104] This amount is based on the use of Pittsburgh #8 washed bituminous coal.

economic use. Based on the IGCC design and the operations of existing IGCC plants, the slag is expected to be an inert, vitreous (glass-like) material as described in Chapter 6.

Elemental sulfur and sulfuric acid

These materials are now commercially produced and available. The materials produced by the IGCC would be very similar to the material now being sold commercially. The characteristics of this by-product are better known than those of the other expected by-products. These by-products may be classified as hazardous waste. If it is determined to be hazardous waste, an exemption under hazardous waste rule would be required for beneficial use.

Storage and Handling of Construction and Operation By-Products

Fly ash

Fly ash collected in the fabric filter hoppers and the air heater hoppers (see Figures Vol. 2-1 to 2-3) would be conveyed to the fly ash storage silo via a pneumatic transport system using low-pressure air from a blower. The fly ash would be discharged through a wet or dry unloader and conveyed through a telescopic unloading chute into a truck for disposal or utilization.

Bottom ash

Bottom ash from the boiler would be collected and transported on a submerged scraper conveyor and dewatered. The ash would then be collected in a dump truck and hauled to a storage pad on site (see Figures Vol. 2-1 to 2-3). The ash collected on the storage pad could be loaded into a truck using a front-end loader. It could then be taken to a landfill or recycled as permit allows.

Gypsum

A gypsum (calcium sulfate, or $CaSO_4$) slurry would be produced by the injection of oxygen into the calcium sulfite produced in the absorbed reaction tank (See discussion in Chapter 6.) The gypsum slurry, at approximately 15 percent solids, would be pumped to dewatering equipment. Dewatering of the gypsum slurry would be accomplished in two stages. The first stage (primary dewatering) would be accomplished using hydroclones, which would use centrifugal force to concentrate the slurry. Underflow from the hydroclones, which would typically have 35 to 50 percent solids, would be sent to vacuum filters for secondary dewatering. Overflow from the hydroclones, which would have 3 to 5 percent solids, would be returned to the absorbers.

Secondary dewatering would involve vacuum filters. Either rotary drum or horizontal belt filters might be utilized, depending on the end user's requirements for the gypsum. The vacuum filters would reduce the gypsum filter cake moisture content to 10 percent or less.

A belt conveyor system would transport the gypsum from the vacuum filters in the dewatering building to an adjacent storage shed. In its air permit, WEPCO has proposed a storage shed that could contain three days of gypsum by-product. The storage would be provided to allow a wallboard manufacturing plant to continue production during periods of equipment-related power plant outages. The wallboard plant would not be a WEPCO facility; it is described in more detail near the end of this chapter. Sites for a wallboard plant, however, have been designated by WEPCO in each alternative plant layout (see Figures Vol. 2-1 to 2-3) and therefore have been considered in the cumulative environmental impact assessment of this project.

The current licensed landfill at the OCPP (Caledonia Landfill) is not permitted by the DNR to accept gypsum. WEPCO must contract with commercial landfills for gypsum disposal until a wallboard plant is available to accept it or until existing WEPCO landfill permit modifications could be sought and approved.

Gasifier slag

Slag produced in the IGCC process is a vitrified product with glass-like properties. It would be removed from the bottom of the gasifier and transferred to a holding tank. The tank would be dewatered, and the material would be removed and transferred to on-site storage.

Elemental sulfur or sulfuric acid

Either elemental sulfur or liquid sulfuric acid would be produced as part of the AGR process for the IGCC unit. WEPCO proposes an on-site, three-day storage for liquid sulfuric acid. Based on production of 62,400 gallons of sulfuric acid per day; a bulk liquid storage of 200,000 gallons would be needed.

WEPCO has stated its intention to haul 30 truckloads (at 3,000 gallons per truckload) per day from the power plant on a Monday through Friday basis. Rail cars hold a capacity of 10,000 to 11,000 gallons and could be considered for longer distance shipments. This sulfuric acid may be classified as a hazardous material. The storage and transportation of this solution would be regulated as a hazardous material like conventionally manufactured sulfuric acid.

Excavation debris

As discussed in Chapter 10, extensive site work (excavation, grading, and relocation of soils) would be needed during the construction of the ERGS to reshape the bluffs and create a relatively flat site to build the new power plant units.

If the excavation material were to be all clean soil, brick, concrete, and similar materials, the excavation and disposal could be done without additional regulation. However, past studies indicate that ash and other solid waste materials were buried on the OCPP property before they were regulated. Some of these unregulated disposal sites are known to WEPCO staff, and some are yet to be identified. These sites or EADAs are described in an earlier section of this chapter.

When a waste site or a contaminated site is encountered during construction, a site remediation is needed before construction on that location can continue. The DNR must be notified and a remediation plan must be submitted for the DNR approval. It is anticipated that approximately two million cubic yards of material

would have to be managed either on site or off site during the construction. WEPCO would need to develop a comprehensive material handling plan to manage the excavated material. The plan, to be submitted to the DNR for approval, would have to include soil and waste characterization, temporary storage information, off-site transportation, and other items.

WEPCO has stated its intention to use most of the materials on site for alterations at the two closed landfills. These activities are explained later in this chapter.

Structure demolition debris

If the North Site were approved WEPCO would demolish the former North Oak Creek Power Plant buildings to make room for the proposed IGCC plant. An environmental assessment of the buildings would be needed first to determine clean-ups that would be required before demolition could begin. WEPCO would need to work with the DNR during every step of the demolition process. It would be required to recycle as much of the building material as possible.

Dredged materials from Lake Michigan

Dredging activities necessary for construction in Lake Michigan are discussed in Chapter 8. Decisions would need to be reached on specific dredging techniques and on the ultimate disposal options for the dredged material before a Wis. Stat. ch. 30 dredging permit could be issued. WEPCO is discussing four methods of dredge material disposal:

- Landfilling the dredge spoils on WEPCO property.
- Landfilling the material off site in a licensed landfill.
- Using the spoils on site as construction fill.
- Using the spoils as beach nourishment.

DNR believes that a combination of these disposal options would be applicable, depending on the results of recent and future sediment sampling and characterization activities. However, dredged material is considered solid waste in Wisconsin. Under Wis. Admin. Code ch. NR 500, solid waste may be disposed of only in an approved landfill. Since WEPCO intends to deposit dredge materials in other places in addition to landfills, the company would also need an official DNR exemption from the requirements of NR 500.

Changes in hauling methods and timing

WEPCO does not anticipate any substantial changes in the hauling methods or routes for solid waste from the new facilities if the North or South Sites are used as proposed in the CPCN application. However, use of the North Site under the CUP Option negotiated between WEPCO and the city of Oak Creek in May 2003, would alter the ash haul routes on the OCPP property. The relocated ash haul roads are shown and discussed in Chapter 12.

Regardless of the site or plant layout selected, there would be an increase in truck traffic for transportation of ashes and other by-products from the ERGS to other WEPCO-owned landfills, if the Caledonia Landfill capacity is exhausted. There would also be a great increase in hauling traffic during construction for the

dredged and excavated materials that would be deposited on the OCPP site. The impacts related to noise and traffic associated with moving dredged and excavated materials to the deposit site are described in Chapter 10. Figures Volume 2-1 to 2-3 shows the expected locations for the deposit of dredged and excavated materials.

Impacts on operating landfills

Disposal in local landfills

As discussed at the beginning of this chapter, WEPCO operates three licensed landfills in the southeast region. The three active landfills are not near capacity and are expected to remain operational for many years. As noted above, the SCPC units are expected to generate 257,800 tons/year (128,900 tons per unit per year).

Need for changes in landfill operating plans or licenses

WEPCO is required to submit plan modifications to the DNR for any of the landfills they plan to use for disposal of newly generated by-products. WEPCO may also be required to update the design of these landfills to provide better protection for the groundwater.

Impacts on existing closed landfills

WEPCO has closed several landfills in southeast Wisconsin over the past years. The two closed ash landfills on the OCPP property, Oak Creek North and Oak Creek South, are not permitted to accept waste. WEPCO is responsible for monitoring these landfills and making sure that they do not adversely impact the environment. There would be changes to both of these landfills if the ERGS project is approved. These changes are explained below and can be seen in Figures Volume 2-1 to 2-3.

Oak Creek North (OCN)

Existing conditions

The OCN landfill was originally opened in the mid-1960s and has been covered and closed for more than 20 years. The operating license for the OCN landfill was allowed to expire in 1988. The landfill covers 40 acres and contains 1,000,000 cubic yards of ash. The landfill top is relatively flat with 2:1 side slopes.

This is not an engineered landfill, and it does not meet current landfill design standards. The flat top and the lack of a liner have resulted in several adverse environmental impacts. Rainwater has entered the landfill from the top and has built up in the waste. Leachate (liquid that has come in contact with the waste) has been leaving the toe of the landfill to the east and southwest of the landfill slope. There is no existing leachate collection system at these locations, so leachate has been entering several wetlands around the landfill. In addition, leachate appears to be entering the groundwater. Concentrations of boron exceeding the groundwater standards have been detected in the monitoring wells outside of the landfill.

WEPCO plans for the landfill

Current plans for the ERGS project include the construction of access roads and temporary parking facilities over the majority of the footprint of the OCN landfill. In addition, a significant amount of fill generated by

the excavation for the construction of the two SCPC units would occur in the OCN area. Proposed modifications to the OCN landfill would be in two phases:

Phase I – Ash would be removed and relocated from the south section to the north section of the landfill to accommodate construction of a truck access road in the southeast corner of the existing area.

Phase II – Fill would be placed and temporary parking facilities would be constructed. These actions would also result in changes in surface drainage off of the landfill. See the discussion in Chapter 8 on stormwater discharge. Long-term plans for the OCN site include source removal for use as a supplemental fuel in the proposed generating units.

Environmental monitoring

Although OCN is closed and no longer accepts solid wastes under the closure license approval, it is being monitored to ensure ground and surface waters of the state are protected. The original monitoring system includes a total of nine piezometers (Figure 9-4). Of the nine piezometers, six were located within ash disposal areas. The groundwater monitoring system was evaluted in the early 90's and upgraded. At the present time, there are four monitoring wells and a nest of wells located outside of ash areas. There are also two leachate head wells.

The data collected from the monitoring wells indicates that the groundwater is flowing mainly to the northwest and partially to the east toward Lake Michigan. A horizontal gradient of 0.05 ft/ft was calculated between well B29A and Lake Michigan. WEPCO has been monitoring the groundwater for many years. Analysis of groundwater samples taken from well MW33 showed elevated concentrations of ash parameters boron and sulfate (see Figures 9-5 and 9-6).

Figure 9-4 **Oak Creek North Landfill with mapped groundwater monitoring peizometers and leachate head wells**

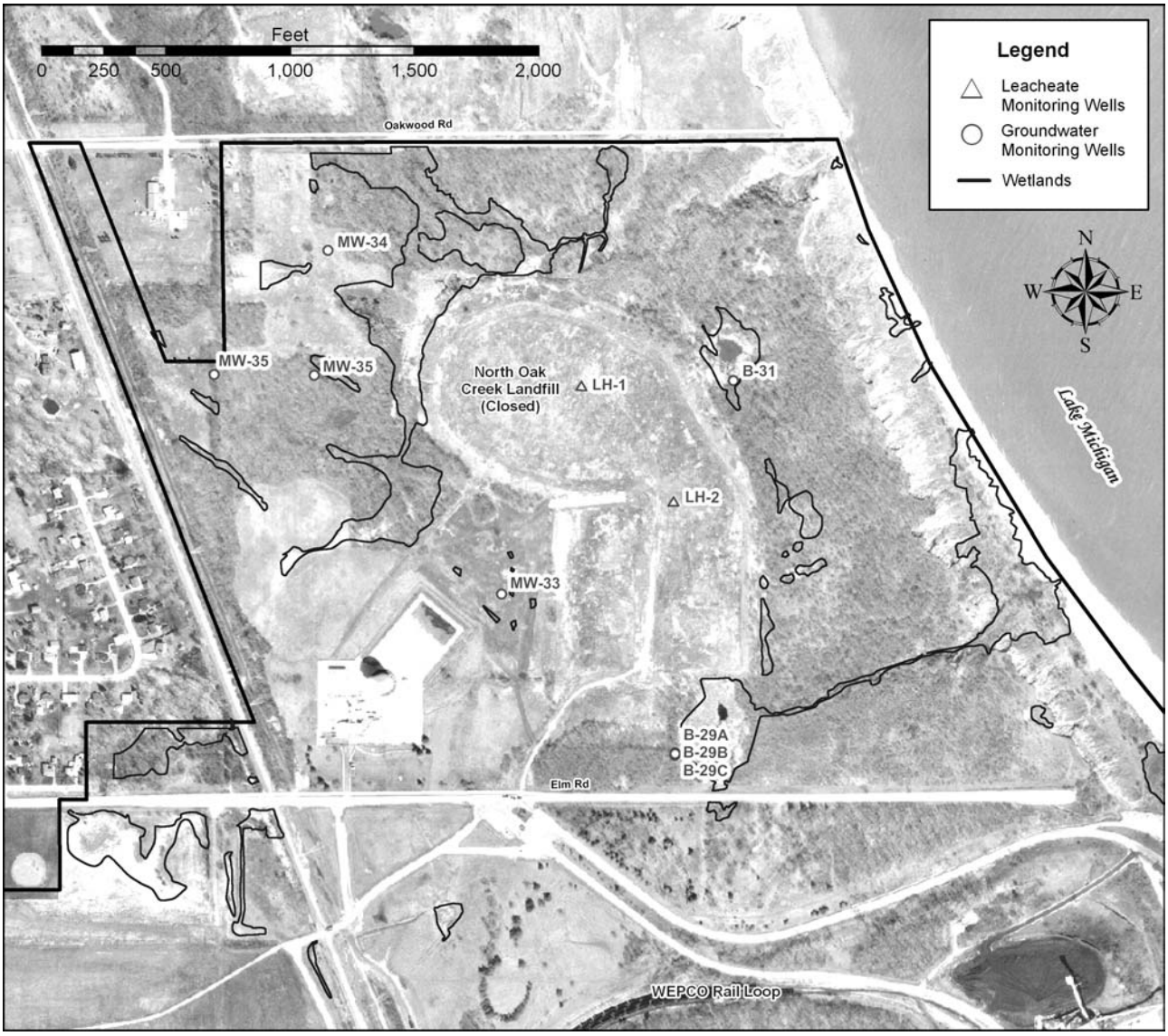


Figure 9-5 Boron concentrations at MW33 in mg/liter between 1994 and 2003

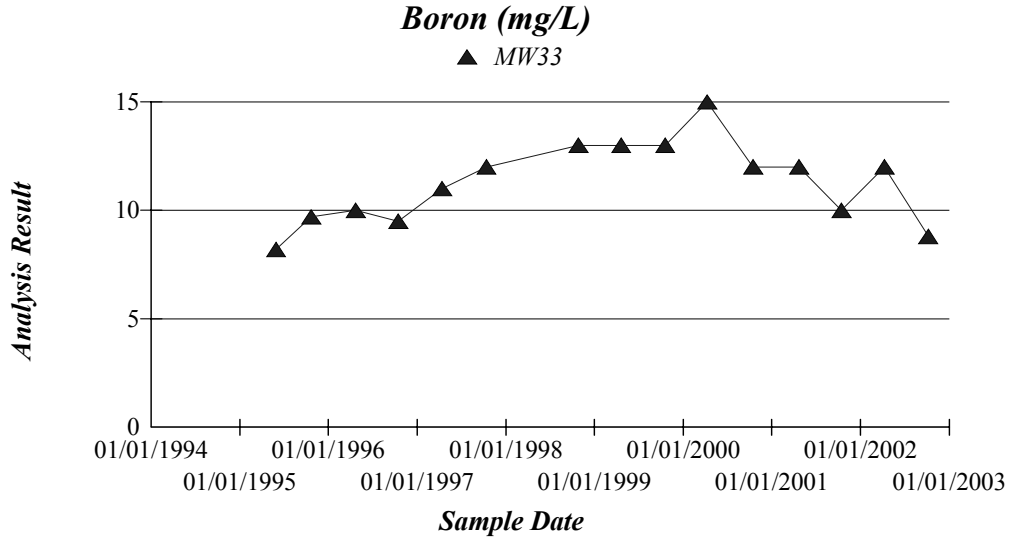
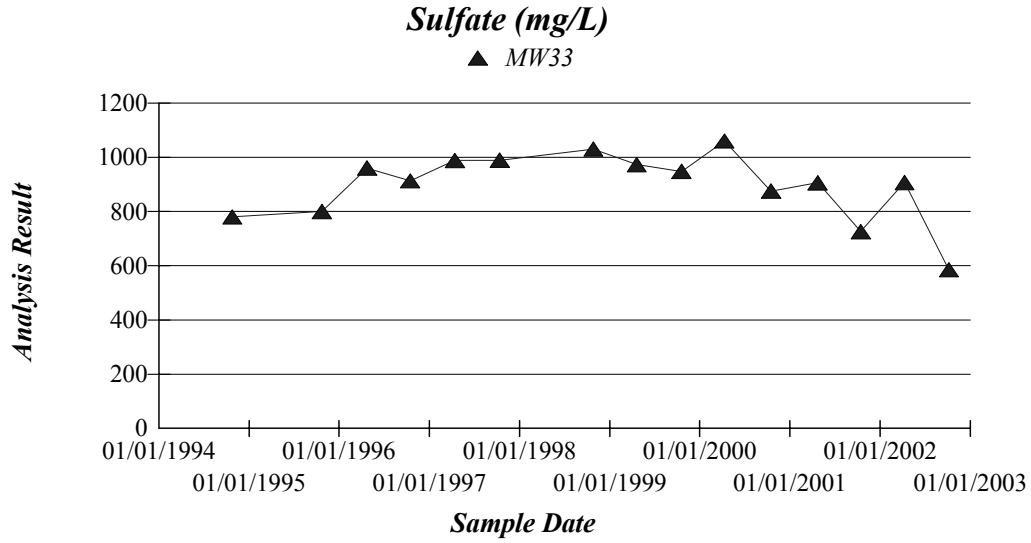


Figure 9-6 Sulfate concentrations at MW33 in mg/liter between 1994 and 2003



Data also show exceedance of boron in monitoring well B-31. The two monitoring wells located northwest of the landfill have shown no impacts from the ash landfill based on current groundwater monitoring.

The DNR would require additional groundwater monitoring in response to changes proposed in the ERGS project. The additional monitoring would determine if the construction activities at this property are having adverse impacts on the groundwater and help determine what steps needs to be taken to correct them.

Oak Creek South (OCS)

Coal combustion by-products generated by the OCPP were disposed of at the OCS beginning in 1974 when it was licensed until it reached its capacity in May 1992 and was covered. The OCS landfill covers 80 acres and contains 3,760,000 cubic yards of ash. Cover improvements were made primarily on the north and west slopes in 1995 in substantial conformance with the 1974 Plan of Operation for the site and Wis. Admin. Code ch. NR 506. The final cover consists of a minimum of two feet of fine-grained soil covered by six inches of seeded, fertilized and mulched topsoil. In 1999, a leachate collection system was installed near the toe of the west slope.

As discussed in Chapters 10 and 11, construction of the ERGS would require excavation of a significant amount of native soil for construction of the new power plant units and other features. The proposed modifications to the OCS landfill involve:

- Placement of soil on the top. Fill would be placed at a minimum thickness of eight feet over the cover of the OCS.
- Compaction and grading of the newly placed soil to prepare a construction laydown area. Following the relocation of soil, predominantly clay in composition, from the ERGS excavation areas to the top of the OCS, a construction laydown area would be placed as the final surface.
- Construction of access roads and development of short- and long-term stormwater management facilities.

Remediations

- Several remedial activities may be needed during or after completion of construction of the ERGS facilities.
- EADA - Disturbances near or in the areas of the early ash disposal areas would require full investigation of these areas. WEPCO would be required to submit remedial plans in accordance with Wis. Admin. Code ch. NR 700.
- Unidentified contaminants - The construction of the ERGS would require disturbance of a large portion of the OCPP property. If contractors encountered any contaminants, WEPCO would be responsible to document and prepare a remedial action plan to clean up the contaminants before any work could continue in that area.
- Landfills - There are two closed landfills located on the OCPP property. These landfills have impacted the local groundwater. WEPCO is proposing to use these landfills for either soil storage or other construction activities. WEPCO would be required to upgrade the groundwater monitoring system for these landfills and propose remedial action to improve the groundwater quality.
- Shooting range - Disturbance of the parcel used for a shooting range would require full investigation of environmental impacts on these areas. WEPCO would be required to submit remedial plans for lead and other pollutants of concern in accordance with NR 700.

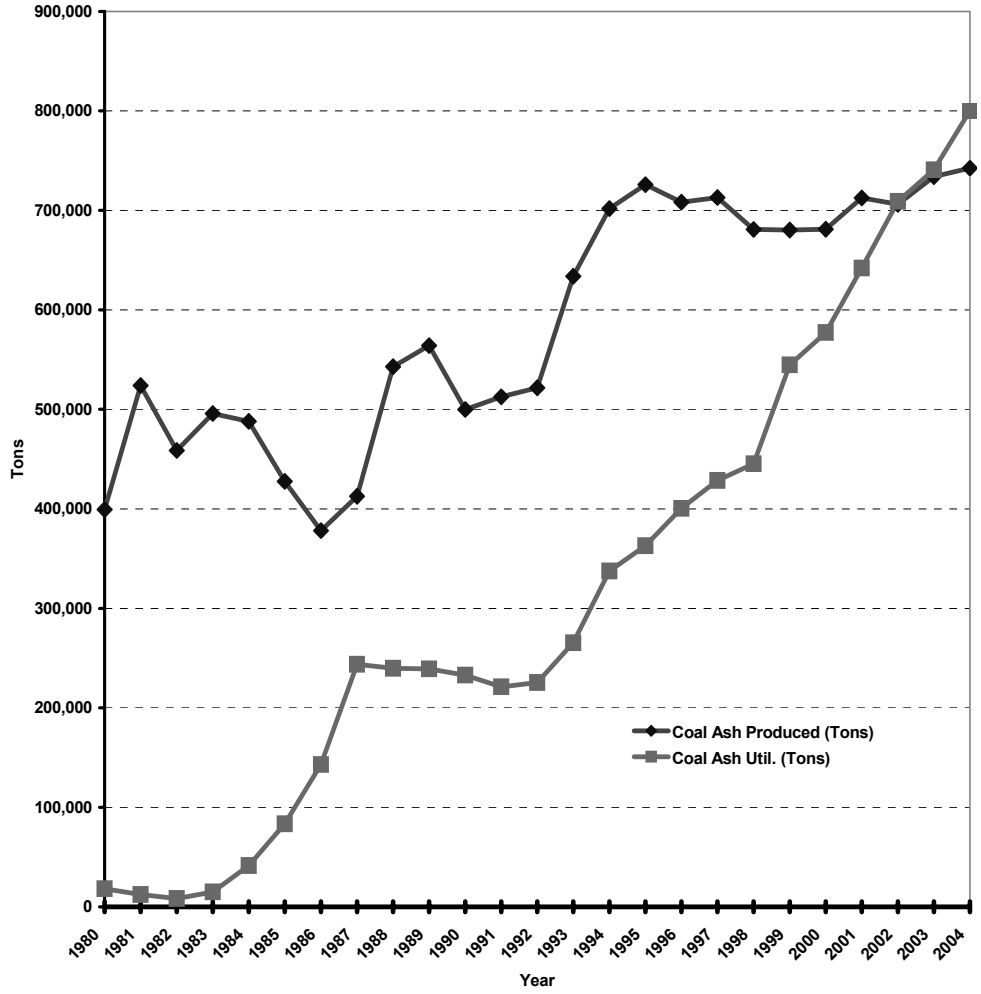
Beneficial Re-use

Ash

WEPCO has a beneficial ash re-use program in place. Companies have been working with WEPCO since 1980 to market fly ash and bottom ash from WEPCO's existing coal-fired plants. Since 1980, re-use of the ash has increased until about 96 percent of the by-products from its power plants are now beneficially used. Figure 9-7 illustrates this increase and WEPCO's hope to utilize more than it produces after 2003. WEPCO is now proposing, based on past experience and recent contacts with by-product marketers, to increase utilization of the ERGS by-products from zero percent to full utilization within 10 years on a straight line basis from the start of commercial operation of these new generating units.

Bottom ash is now being utilized as base or sub-base material for building floors and foundations, paved roads, and parking lots. Fly ash is now being utilized in cements as a raw feed material for portland cement production, soil stabilization, cold in-place recycling of asphalt pavements in controlled low-strength materials, and as a supplemental fuel.

Figure 9-7 WEPCO coal combustion by-product (ash) production and utilization, in tons, between 1980 and 2002 and projected to 2004



Although the ash re-use companies' projections are more optimistic, WEPCO projects full utilization of ashes within ten years of each unit's commissioning. WEPCO's projections are illustrated in Table 9-2 for the ashes and slag. Even with these projections, WEPCO assumes that the market for recycling of ash and slag will grow and remain available to handle the ERGS waste. It also assumes that all synthetic gypsum would go to wallboard production and all sulfur or sulfuric acid would be utilized for commercial uses from the time when it is initially produced.

WEPCO has approached marketers for their projections on reaching full utilization of the fly ash and bottom ash and has received optimistic replies (these are filed at the PSC as part of WEPCO's CPCN application). A.W. Oakes & Son of Racine, Wisconsin has indicated that it could utilize 100 percent of the bottom ash within two years of the commissioning of each unit. Mineral Solutions, Incorporated has indicated that it could utilize 100 percent of the fly ash within three years of the commissioning of each unit. This would require working to expand the market for Class F fly ash. Class F fly ash can be used to produce high performance concrete if it meets ASTM standards and has consistent quality from a base load power plant. WEPCO's current sources of Class F fly ash have high carbon content and thus are not suitable for use in concrete.

Table 9-2 WEPCO's projected annual coal ash and slag quantities for landfill between 2007 and 2021, in tons[105]

Year	SCPC Unit 1		SCPC Unit 2		IGCC	Total
	Fly ash	Bottom ash	Fly ash	Bottom ash	Slag	
2007	103,100	25,800	0	0	0	128,900
2008	92,790	23,220	0	0	0	116,010
2009	82,480	20,640	103,100	25,800	0	232,020
2010	72,170	18,060	92,790	23,220	0	206,240
2011	61,860	15,840	82,460	20,640	100,000	280,800
2012	51,550	12,900	72,170	18,060	90,000	244,680
2013	41,240	10,320	61,860	15,840	80,000	209,260
2014	30,930	7,740	51,550	12,900	70,000	173,120
2015	20,620	5,160	41,240	10,320	60,000	137,340
2016	10,310	2,580	30,930	7,740	50,000	101,560
2017	0	0	20,620	5,160	40,000	65,780
2018	0	0	10,310	2,580	30,000	42,890
2019	0	0	0	0	20,000	20,000
2020	0	0	0	0	10,000	10,000
2021	0	0	0	0	0	0
Total	567,050	142,260	567,030	142,260	550,000	1,968,6-0

Gypsum

WEPCO has approached several companies on its projections for reaching full utilization of the synthetic gypsum from the SCPC units and has received favorable replies. The synthetic gypsum produced by the wet scrubbers in the SCPC units could be used to manufacture wallboard (also called "drywall" or "sheet rock"). WEPCO indicates that wallboard producers would be competing for the ability to build a manufacturing

[105] Using the Wis. Admin. Code § NR 520.15 (2) standard in-field conversion factor of 1.2 tons per cubic yard would yield a landfill volume requirement of 1,390,527 cubic yards.

plant near the ERGS plant. LaFarge Gypsum, for example, has indicated that it could utilize 100 percent of the gypsum from the ERGS SPCC units within one year of each unit's commissioning.

Ideally, there would be enough gypsum produced that it could be conveyed to a dedicated commercial wallboard plant located on or near the power plant property. Example locations of such a plant are shown in the plant layouts for each site option in Figures Volume 2-1 to 2-3**.** WEPCO has indicated that a company interested in building a wallboard plant could build it on the ERGS site. The commercial wallboard plant would likely be about 500 feet wide and 2,000 feet long, and would use up about 100 acres of the property if the storage shed were included.

If smaller quantities of gypsum are produced, they could be transported to existing wallboard producers to supplement their natural gypsum supplies. Nearby, in Waukegan, Illinois, is the National Gypsum plant which currently uses natural gypsum. It could also take the synthetic gypsum.

Gasifier slag

WEPCO has approached Mineral Solutions, Incorporated on its projections for reaching full utilization of the gasifier slag from bituminous coal, and has received a favorable reply. Full utilization could occur within two or three years of the commissioning of the IGCC unit. Slag produced in the IGCC process would be a vitrified, glass-like product. It could be used potentially for roof shingles, blasting grit, chip seal material for roads and parking lots, or as an alternative sand, gravel, or crushed stone for pavements, parking lots, or foundation bases. WEPCO's projection for full utilization is illustrated in Table 9-2.

Sulfur or sulfuric acid

WEPCO has approached several companies on its projections for reaching full utilization of the sulfur or sulfuric acid produced by the AGR process, and has received favorable replies. The market for sulfuric acid appears to be better at this time than the market for elemental sulfur. The area around Chicago, Illinois, for instance, has become an import market for sulfuric acid. WEPCO predicts that the sulfuric acid from the proposed IGCC unit could be marketed within southeast Wisconsin, northeast Illinois, and northwest Indiana.

New landfills

WEPCO might not be able to dispose of all the by-products that are generated in its own landfills. If it could not, outside disposal would have to be considered.

WEPCO is not proposing new landfills at this time. However, if the recycling projections turn out to be too optimistic, additional landfill spaces could be needed.